Graduate Program in Mathematics at Duke

Some Duke Math Faculty

November 5, 2008
Why graduate school in Math?

Nothing is meaningless if one enjoys doing it. – Gertrude Stein

1. If you enjoy doing math...
2. If you are curious on how things you’ve learned fit together in a bigger picture...
3. If you enjoy the challenge of understanding new problems...
4. If you can imagine expressing your solutions as a creative and even artistic pursuit...

... then searching for the deeper meanings, patterns, and structures in mathematics can be very rewarding.
Why Duke University?

1. Nationally ranked graduate research programs in pure and applied math
2. 26 research professors, 40+ graduate students, many visiting researchers and postdoctoral fellows
3. Small class size, direct attention from professors
4. 2-year course sequences leading to research in many different fields
Faculty research areas

- **Geometry** (Algebraic and Differential)
- **Topology** (Algebraic and Computational)
- **Algebra and Number Theory**
- **Analysis** (Classical, Geometric, and Functional)
- **Partial Differential Equations** (Integrable systems, Nonlinear, Applied)
- **Mathematical Physics** (General Relativity, String Theory)
- **Probability and Stochastic Processes** (Computational and PDE)
- **Fluid Dynamics**
- **Mathematical Biology** (Cell, Computational, Physiology)
- **Scientific Computing and Numerical Analysis**
Beautiful campus...

Hard-working students!
Prof. Lenny Ng studies the topology of knots and 3D manifolds.

Ideas from physics and other parts of pure math have led to exciting breakthroughs in recent years.
Prof. Chad Schoen studies 3D figures with many singularities.

Prof. Paul Aspinwall uses such shapes in superstring theory to understand the geometry of the universe.

This figure is related to algebraic geometry, which studies solution sets to systems of polynomial equations.
Prof. Ezra Miller studies geometry, algebra, and combinatorics.

This image depicts a foldout of a polyhedron; shortest paths from the green "source point" on the spherical surface become straight segments in the foldout.
Prof. Tom Witelski studies problems in fluid dynamics and partial differential equations relating to microfluids.

Shown is the evolution of a liquid film into droplets.
Profs. Anita Layton and Harold Layton use mathematical modeling techniques to solve some of the longest-standing mysteries in traditional physiology.

Shown is a schematic drawing of the inner medulla of a rat kidney.
### Mathematical Biology—Electrophysiology

- Much effort, both experimental and modeling, is directed to the prevention of sudden cardiac arrest.
- Prof. Schaeffer and his collaborators in the Physics and Biomedical Engineering Departments, and in the Medical School, are using mathematical modeling to investigate aspects of electrophysiology.
Deficiencies in folate, methionine, and glutathione metabolism are associated with many human health disorders.

Professor Reed uses mathematical models to study the mechanisms by which these networks cause the disease processes and how the networks are affected by diet, genes, and the environment.
Interested? Want to learn more?

- Go to our graduate program webpage:
  http://www.math.duke.edu/graduate/

- Email our Director of Graduate Studies:
  dgs-math@math.duke.edu

- Ask me!